

# Cascading events simulation for disaster-sensitive metropolitan areas: Resilience enhancement with visualization of consequences of large-scale disasters

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**Abstract:** In metropolitan areas such as Tokyo, there is an extreme concentration and interdependence of functions, human flows, logistics, money flows, and information flows that support socioeconomic activities, and there is a serious concern that a single large-scale disaster could trigger a complex chain of disasters that could spread rapidly and cause more damage than expected. In particular, the greater metropolitan area is exposed to a major disaster risk because of the large day-night population gap caused by commuters and students.

The presentation will discuss on the status of prototype models and tools for dynamically predicting disruptions caused by the disruption of socioeconomic activities and the amplification of failures due to the chain of disasters in large-scale disasters, based on the visualization technology for disaster risks and their impacts and the disaster scenario generation technology for training purposes developed in the RISTEX (SOLVE for SDGs) project, while engaging in repeated dialogue with local governments and core companies responsible for disaster response in the greater Tokyo metropolitan area.

In addition, the project also organizes issues in efforts to implement tools and workshops to support business continuity management of critical infrastructure providers, particularly railroad companies, which are required to respond to the large number of people unable to return home in the event of a large-scale disaster in a metropolitan area.

The objective of the project is to develop a tool (prototype) that visualizes the disaster process and supports decision-making and action in order to predict and take “pre-emptive measures” against the chain events of future large-scale disasters, while at the same time providing a forum for stakeholders, including local governments, critical infrastructure providers, businesses, and residents in specific regions, to hold “roundtable discussions” and conduct training exercises. The objective is to foster a sense of ownership of the resilience of the region to shared disaster chain risk through collaboration among stakeholders by providing a forum for dialogue, training, and exercises in a “roundtable” format. The dialogue, drills, and exercises will be conducted by invited experts and practitioners from various fields of expertise in disaster response, and will attempt to build the foundation for a highly effective system while receiving advice from them.

**Keywords:** *Large-scale disasters, mega-cities, cascading events, resilience enhancement*